SHOCK MANAGEMENT/ FLUID RESUSCITATION

This TCCC pharmacology reference provides drug administration information based solely on TCCC Guidelines. This reference should not be used for the administration of these medications for any environment outside of tactical combat casualty care on the battlefield or in the combat/tactical setting.

TRANEXAMIC ACID (TXA)

Antifibrinolytic agent

Used by **Combat Medics (CM)**

Casualties anticipated to need significant blood transfusion; hemorrhagic shock, one or more major amputations, penetrating torso trauma, or evidence of severe bleeding; casualties with signs or symptoms of significant traumatic brain injury or altered metal status associated with blast injury or blunt trauma.

DOSAGE(S):	**2 gm** slow IV/IO push
ROUTE(S):	IV and IO
CONTRA-INDICATIONS:	Hypersensitivity to TXA, subarachnoid hemorrhage, active intravascular clotting, considered relatively safe in pregnancy, if clinically indicated
POTENTIAL SIDE EFFECTS:	Blurred vision or impaired color vision, nausea, vomiting, diarrhea (temporary)
DRUG INTERACTIONS:	Factor IX complex concentrates or anti-inhibitor coagulant concentrates (risk of thrombosis may be increased)

ONSET / PEAK / DURATION: 30 sec-5 min/30 min-2 hr/24 hr

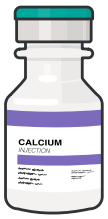
TACTICAL CONSIDERATIONS: Administer as soon as possible but not later than 3 hours after injury.

CALCIUM

Calcium supplement

Used by **Combat Medics (CM)**

For use after blood product transfusions.



DOSAGE(S):	**1 gm**
ROUTE(S):	IV or IO
CONTRA-INDICATIONS:	Contraindicated in patients with ventricular fibrillation, hypercalcemia, hypophosphatemia, or renal calculi, use cautiously in digitalized patients and patients with sarcoidosis, renal or cardiac disease, respiratory acidosis, or respiratory failure, potential benefits may warrant use in pregnant women despite potential risks if the alternative is worse
POTENTIAL SIDE EFFECTS:	Tingling sensations, headache, irritability, weakness, syncope with rapid IV injection, mild decrease in blood pressure, vasodilation, bradycardia, arrhythmias, rebound hyperacidity, nausea polyuria, renal calculi, hypercalcemia, local reactions
DRUG INTERACTIONS:	Decreased bioavailability with atenolol, fluoroquinolones and tetracyclines, calcium channel blockers decrease calcium effectiveness, cardiac glycosides increase digitalis toxicity, thiazide diuretics cause a risk of hypercalcemia

ONSET / PEAK / DURATION: Immediate/immediate/1-2 hr

TACTICAL CONSIDERATIONS: Administer one gram of calcium as either 30 ml of 10% calcium gluconate or 10 ml of 10% calcium chloride; immediately after the first transfused blood product. Monitor calcium chloride infusion closely as severe necrosis and skin sloughing can occur if peripheral IV extravasates.

EPINEPHRINE

Sympathomimetic catecholamine (adrenaline analog)

Used by **Combat Medics (CM)**

For emergency treatment of **anaphylaxis** or allergic reactions.

DOSAGE(S):	**0.3 mg** (3 ml of 1:1000 solution), repeated every 5 to 10 minutes as necessary
ROUTE(S):	IM or subcutaneous
CONTRA-INDICATIONS:	None
POTENTIAL SIDE EFFECTS:	Anxiety, restlessness, tremor, weakness, dizziness, sweating, palpitations, pallor, nausea and vomiting, headache, disorientation, tachycardia
DRUG INTERACTIONS:	Antihypertensives reduce the pressor effects of epinephrine, thyroid hormones, antihistamines and some anti-arrhythmic medications increase its arrhythmogenic effects

ONSET / PEAK / DURATION: 15-30 sec (IM<subcutaneous)/20 sec to 4 min/5-10 min

TACTICAL CONSIDERATIONS: Standard EpiPens® deliver the recommended 0.3 mg IM dose. Casualties in hemorrhagic shock have poor tissue perfusion to their extremities reducing the delivery of epinephrine; use large muscle groups closest to the torso (in order of preference: thigh > deltoid > gluteal).

DIPHENHYDRAMINE

First generation antihistamine (H1 blocker)

Used by **Combat Medics (CM)**

For emergent treatment of **anaphylaxis** or allergic reactions and non-emergent treatment of adverse drug reactions.

DOSAGE(S):	**25 mg** initial dose, may consider **50 mg** based on clinical situation; repeat q 4-6 hr prn; max daily dose 300 mg
ROUTE(S):	IM, IO & IV
CONTRA-INDICATIONS:	Documented hypersensitivity to diphenhydramine, breastfeeding mothers, use in pregnancy if clearly needed
POTENTIAL SIDE EFFECTS:	Sedation/somnolence/sleepiness, drowsiness, unsteadiness, dizziness, headache, rare extrapyramidal effects, tremor, or convulsions
DRUG INTERACTIONS:	Accentuates effects of other medications that cause drowsiness or decreased level of consciousness (sedatives, hypnotics)

ONSET / PEAK / DURATION: 10 sec-20 min (IV<IO<IM)/15 min-2 hr/2-6 hr

TACTICAL CONSIDERATIONS: There is no evidence to support H1-antihistamines alone in emergency management of anaphylaxis – diphenhydramine should only be used as an adjunct to epinephrine during anaphylaxis management; the slower onset and longer duration may help sustain effects of successful treatment. Useful for minor reactions that are not life-threatening. Casualty weapons, communications and sensitive equipment should be secured.

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